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EXAMINER

SMITH, JENNIFER A

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.



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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/533,567
Filing Date: May 03, 2005
Appellant(s): DOMEN ET AL.

Roger C. Hahn
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 07/06/2009 appealing from the Office action mailed 02/04/2009.

Art Unit: 1793

The appeal brief is filed in the new format under the revised BPAI final rule before the effective date of the BPAI final rule. The Office published the BPAI final rule to amend the rules governing practice before the BPAI in *ex parte* patent appeals. See *Rules of Practice Before the Board of Patent Appeals and Interferences in Ex Parte Appeals; Final Rule*, 73 FR 32938 (June 10, 2008), 1332 Off. Gaz. Pat. Office 47 (July 1, 2008). However, the effective date for the BPAI final rule has been delayed. See *Rules of Practice Before the Board of Patent Appeals and Interferences in Ex Parte Appeals; Delay of Effective and Applicability Dates*, 73 FR 74972 (December 10, 2008). In the notice published on November 20, 2008, the Office indicated that the Office will not hold an appeal brief as non-compliant solely for following the new format even though it is filed before the effective date. See *Clarification of the Effective Date Provision in the Final Rule for Ex Parte Appeals*, 73 FR 70282 (November 20, 2008). Since the appeal brief is otherwise acceptable, the Office has accepted the appeal brief filed by appellant.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

Art Unit: 1793

(8) Evidence Relied Upon

Takagaki et al., "Structure of Titanium Niobate Oxide Sheet and Solid Acidity," 90th Catalyst Forum of Catalyst Soc., Sept. 10, 2002.

Hara et al., "Metal Oxide Nano-sheet as Solid Acids," Shokubai, June 10, 2002; 44:44.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1, 3, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takagaki et al. (2002).

Takagaki et al. teaches 2-dimensional metal oxide sheets composition of HTiNbO_5 or HTi_2NbO_7 in Abstract or $\text{H}_{0.9}\text{Ti}_{0.9}\text{Nb}_{1.1}\text{O}_5$ in Section 3, Results and conclusion. The Ti/Nb atomic ratio (z) in these cases, respectively, is 1, 2, and 0.818. "x" is 1, 2, and 0.9 and "y" is 1, 1, and 1.1. Takagaki et al. teaches a catalyst

Art Unit: 1793

composition in Section 2 and 3, Results and conclusion. The Ti/Nb atomic ratio (z) in this case is ranges from 0.818 to 5.

Claim 1 contains process limitations in a composition claim – as such, they are given little weight. The claimed product appears to be the same or similar to that of the prior art, although produced by a different process. The burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. See *In re Marosi*, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983).

The teachings of Takagaki et al. and the claims differ in that Takagaki does not teach the exact same proportions as recited in the instant claims. The invention is broadly disclosed in the Takagaki reference, however it is noted that there is no exemplified embodiment.

However, one of ordinary skill in the art at the time the invention was made would have considered the invention to have been obvious because the compositional proportions taught by Takagaki et al. overlap the instantly claimed proportions and therefore are considered to establish a prima facie case of obviousness. In the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a prima facie case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). See MPEP 2144.05 I. One would have been motivated to modify this

Art Unit: 1793

ratio because investigation of changes in catalytic activity associated with changes in atomic ratios has been conducted in the past [See the Introduction of Takagaki]. The Takagaki reference discloses the relationship between the Ti/Nb ratio and the structural features and acidic properties of the catalyst [See Takagaki, 2nd Paragraph]. It is within the level of one of skill in the art to adjust this ratio to reach a level of desirable acidity when used as a catalyst in ester reactions [See Paragraph 1]. It would have been obvious to one of ordinary skill in the art to select any portion of the disclosed ranges including the instantly claimed ranges from the ranges disclosed in the prior art reference, particularly in view of the fact that;

“The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages”, In re Peterson 65 USPQ2d 1379 (CAFC 2003). Also, In re Geisler 43 USPQ2d 1365 (Fed. Cir. 1997); In re Woodruff, 16 USPQ2d 1934 (CCPA 1976); In re Malagari, 182 USPQ 549, 553 (CCPA 1974) and MPEP 2144.05.

In regard to claim 3, Takagaki et al. also teaches the organic ammonium used in the catalyst production process to be tetrabutylammonium in Section 2. Claim 3 contains process limitations in a composition claim – as such, they are given little weight.

Art Unit: 1793

Claim 10 is drawn to an ester dehydration condensation catalyst comprising the catalyst of claim 3. Claim 10 is obvious over the prior art of record. Takagaki et al., in Section 3, teaches a higher activity in esterification reaction with the titanium niobate oxide sheet aggregate than with zeolite or hydrous niobic acid. Takagaki also gives motivation to modify the invention saying when the composition of HTiNbO_5 is changed, acid catalytic activity is changed along with the change of composition.

Claims 5 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takagaki et al. (2002) and further in view of Hara et al. (2002).

In regard to claim 5, Takagaki et al. fails to teach a surface area. Claim 5 contains process limitations in a composition claim – as such, they are given little weight.

Hara et al., in Section 2, teaches preparation of the catalyst HTiNbO_5 in an aqueous solution of tetrabutylammonium and with a 0.1M solution of nitric acid. The nano-sheet material has 150 times larger surface area of $150 \text{ m}^2/\text{g}$ compared with that of before removal. One of skill in the art would expect to obtain the same value from the solid acid catalyst taught in the Takagaki reference because they are made by substantially similar processes.

Claim 12 is drawn to an ester dehydration condensation catalyst comprising the catalyst of claim 5. Claim 12 is obvious over the prior art of record – Takagaki, and Hara. Takagaki et al., in Section 3, teaches a higher activity in esterification reaction with the titanium niobate oxide sheet aggregate than with zeolite or hydrous niobic acid. Furthermore, this claim 12 recites the intended use of the claimed invention. This must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

(10) Response to Argument

Applicants argue the Examiner's analysis of the Takagaki et al. reference is flawed and that Takagaki does not teach or suggest every limitation of the rejected claims 1 and 3. Applicants point to Table A in the Arguments section to set forth the "z" values from Takagaki et al. compared to the claimed values. This argument is not persuasive. The invention is broadly disclosed in the Takagaki reference, however it is noted that there is a lack of exemplified embodiments, Ti/Nb ratio 0.818 being the only specific example given. However, one would have been motivated to modify this ratio because investigation of changes in catalytic activity associated with changes in atomic ratios has been conducted in the past [See the Introduction of Takagaki]. The Takagaki reference discloses the relationship between the Ti/Nb ratio and the structural features and acidic properties of the catalyst [See Takagaki, 2nd Paragraph]. It is within the

Art Unit: 1793

level of one of skill in the art to adjust this ratio to reach a level of desirable acidity when used as a catalyst in ester reactions [See Paragraph 1].

Applicants argue Takagaki et al. does not teach the claimed ratio ranges.

Takagaki et al. teaches 2-dimensional metal oxide sheets composition of HTiNbO_5 or HTi_2NbO_7 in Abstract or $\text{H}_{0.9}\text{Ti}_{0.9}\text{Nb}_{1.1}\text{O}_5$ in Section 3, Results and conclusion. The Ti/Nb atomic ratio (z) in these cases, respectively, is 1, 2, and 0.818. “x” is 1, 2, and 0.9 and “y” is 1, 1, and 1.1. Takagaki et al. teaches a catalyst composition in Section 2 and 3, Results and conclusion.

Applicants argue the Takagaki reference only discloses single data points for the atomic ratio “z” and does not teach a range of optimal values. One would have been motivated to modify this ratio because investigation of changes in catalytic activity associated with changes in atomic ratios has been conducted in the past [See the Introduction of Takagaki]. The Takagaki reference discloses the relationship between the Ti/Nb ratio and the structural features and acidic properties of the catalyst [See Takagaki, 2nd Paragraph] and other titanium/niobium catalysts. It is within the level of one of skill in the art to adjust this ratio to reach a level of desirable acidity when used as a catalyst in ester reactions [See Paragraph 1]. It would have been obvious to one of ordinary skill in the art to select any portion of the disclosed ranges including the instantly claimed ranges from the ranges disclosed in the prior art reference, particularly in view of the fact that;

“The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages”, In re Peterson 65 USPQ2d 1379 (CAFC 2003). Also, In re Geisler 43 USPQ2d 1365 (Fed. Cir. 1997); In re Woodruff, 16 USPQ2d 1934 (CCPA 1976); In re Malagari, 182 USPQ 549, 553 (CCPA 1974) and MPEP 2144.05.

Applicants argue Takagaki et al. would motivate one of ordinary skill to experiment away from the claimed range because the lower “z” values have a higher catalytic activity. A reference is no less anticipatory if, after disclosing the invention, the reference then disparages it. The question whether a reference “teaches away” from the invention is inapplicable to an anticipation analysis. See MPEP 2131.05.

Applicants argue Takagaki et al. fail to teach the claimed limitations for x and y. The Takagaki reference is cited for the generic chemical formula HTiNbO_5 . The values of x and y are taught to be variable by changes in the composition of the starting materials [See Section 3]. It was previously argued that one would have been motivated to modify the “z” value (calculated from values of x and y) because investigation of changes in catalytic activity associated with changes in atomic ratios has been conducted in the past [See the Introduction of Takagaki]. The prior art teaches “x” and “y” values that are very close to the claimed range and provides

Art Unit: 1793

motivation to vary these values. These limitations are held as obvious over the teachings of Takagaki et al. See MPEP 2131.03 III.

Applicants argue the “z” range relied upon by the examiner does not relate to the referenced compounds. The Ti/Nb atomic ratio (z) is a parameter optimized in the production of titanium niobate oxides and these values in the Takagaki reference are taught to be in the range of from 0.818 to 5. This range taught by Takagaki et al. (0.818 to 5) relies on different compounds in the form of the salt of Cs or K. In this case the activities of the solid acid catalysts are disclosed based on the ratio of titanium to niobium and catalyst function is not drawn to the hydrogen, cesium, or potassium components.

In response to the argument that the catalyst production parameters are not disclosed in the Takagaki reference it is first noted that the claimed invention is drawn to a solid acid catalyst composition and when the reference teaches a product that appears to be the same as, or an obvious variant of, the product set forth in a product-by-process claim although produced by a different process. See *In re Marosi*, 710 F.2d 799, 218 USPQ 289 (Fed. Cir. 1983) and *In re Thorpe*, 777 F.2d 695, 227 USPQ 964 (Fed. Cir. 1985). See also MPEP § 2113. The rejections of the claims are upheld because product-by-process claims are not limited to the manipulations of the recited steps, only the structure implied by the steps. Takagaki et al. teach a method that is similar to the methods claimed by Applicants, including proton exchange on

Art Unit: 1793

intermediate layers of nitric acid [See Section 2] and the specific methods claimed by Applicants are not believed to impart a different structure on the final catalyst composition.

Applicants argue, with respect to the ester dehydration condensation catalyst of claim 10, Takagaki et al. would motivate one of ordinary skill to experiment away from the claimed range because the lower "z" values have a higher catalytic activity. A reference is no less anticipatory if, after disclosing the invention, the reference then disparages it. The question whether a reference "teaches away" from the invention is inapplicable to an anticipation analysis. See MPEP 2131.05.

Applicant argues, with respect to claims 5 and 12, the Hara reference cannot be used to provide predictable surface area values. Hara et al., in Section 2, teaches preparation of the catalyst HTiNbO₅. The HTiNbO₅ nano-sheet material taught by Hara et al. has a surface area of 150 m²/g. One of skill in the art would expect to obtain the same value from the solid acid catalyst taught in the Takagaki reference because they are similar products made by substantially similar processes. Applicants confirm this in the Examples and Comparative Examples in the specification. The resultant oxide catalysts have surface areas that lie within the claimed range, for various "z" values and production methods.

For the above reasons, it is believed that the rejections should be sustained.

Art Unit: 1793

Respectfully submitted,

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Art Unit 1793

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